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Pacific Northwest Cool Season Orographic Precipitation

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Flooding and landslides along the Pacific Coast of the United States and nearby inland mountain ranges are the most significant weather threat in the region. Since 1955, fourteen of twenty-one presidential disaster declarations in Oregon and twenty-five of thirty-seven in Washington were related to flooding. The heavy rain associated with these events occurs when moist air flow impinges on the coastal and Cascade mountain ranges. The primary controls on the spatial distribution and intensity of precipitation in the Portland, Oregon region are the low-level wind direction, the 3-D geometry of terrain, the cross-barrier wind speed, and the height of the 0° C level. Most cool season storms have near neutral stability, unlike other orographic regions where stability has a larger role.

Descriptions in the literature often describe regional and seasonal rainfall in the Pacific Northwest as predominantly steady and continuous. However, detailed examination of National Weather Service WSR-88D radar observations reveals varying degrees of precipitation intermittency and areas of locally enhanced reflectivity cells embedded within stratiform rain. Preliminary results for cool season 2006 to 2007 indicate that these embedded cellular structures are a major source of precipitation during heavy rain events. In some events, these cells contribute up to an estimated 60% of the regional rainfall. Current numerical models have difficulty representing intermittent precipitation processes. Our research seeks to understand the physics underlying precipitation intermittency and the life cycle of embedded cells. A better observational understanding of these phenomena will aid in developing improved numerical weather prediction models.

Thursday September 1, 2011, 1:30 PM
Refreshments 1:15 PM
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